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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/069,009

02/20/2002

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L9289.02118

4532

24257

7590

09/27/2005

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EXAMINER

AGHDAM, FRESHTEH N

ART UNIT

PAPER NUMBER

2631

DATE MAILED: 09/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/069,009	Applicant(s) UESUGI ET AL.	
	Examiner Freshteh N. Aghdam	Art Unit 2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

This office action is in response to the communication filed 07/15/2005, claims 1-12 have been cancelled and new claims 13-24 are represented for further consideration by examiner. A new rejection has been made to claims 13-24 in view of the instant application's disclosed prior art, Sugiyama et al, and Lee et al. The subject matter of original claim 8 that is cited in the new claim 20 was indicated as an allowable subject matter previously. However, further consideration of the new claim 20 (i.e. original claim 8) indicates that the subject matter of claim 20 is not allowable in view of the instant application's disclosed prior art and Lee et al.

Information Disclosure Statement

The items that have been crossed off were considered in the previous action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13, 21-22, and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the instant application's disclosed prior art.

As to claims 13, and 23-24, the instant application's disclosed prior art teaches an adaptive modulation communications system comprising a determiner that determines a modulation level for modulating transmission data (Fig. 1, means 1-2; page 2, lines 1-3); an adder that adds an error detecting bit to the transmission data per predetermined error detecting unit in the transmission data (Fig. 1, means 3; page 2, lines 10-12); and a transmitter that transmits a number of error detecting units in accordance with the modulation level simultaneously as a transmission unit (Fig. 1, means 3, 6-1, 6-2, 8, and 9); and the receiving apparatus comprises a receiver that receives the transmission unit (Fig. 1, means 12); and a demodulator that demodulates the error detecting units in the transmission unit using different demodulation patterns respectively (Fig. 1, means 14-1 and 14-2; page 3, lines 14-25), wherein the demodulator uses demodulation patterns that apply to a modulation scheme of a modulation level determined by the determiner (Fig. 1, means 14-1 and 14-2; page 3, lines 14-25; page 4, lines 1-9). One of ordinary skill in the art would clearly recognize that transmitting a number of error detecting units (i.e. bits) in accordance with the modulation level simultaneously as a transmission unit is known as Cyclic Redundancy Check (i.e. CRC) coding and is well known in the art and it is performed in order to enhance error reduction in the communications system. The instant application's disclosed prior art is silent about the demodulator uses demodulation patterns that apply to a modulation scheme of a largest modulation level determined by the determiner.

One of ordinary skill in the art would clearly recognize that the determiner (i.e. the largest modulation level suitable based on the channel quality information) see (Fig. 1, means 1) determines the most suitable modulation level (i.e. the largest modulation level) based on the channel quality information (Fig. 1, page 2, lines 1-6; page 3, lines 14-25). Therefore, it would have been obvious to one of ordinary skill in the art to apply the instant application's disclosed prior art in order to adaptively varying the modulation scheme to perform efficient data transmission (page 1, lines 18-21).

As to claim 21, the instant application's disclosed prior art teaches a detector (Fig. 1, means 16) that performs error detection of a demodulation result in the demodulator per error detecting unit; and a repeat requester (Fig. 1, repeat request signal) that sends a repeat request to the transmitting apparatus according to an error detecting result (Fig. 1, means 16) per error detecting unit (page 3, lines 14-page 4, lines 1-20).

As to claim 22, the instant application's disclosed prior art teaches the determiner determines the modulation level based on channel quality estimated from the repeat request signal (Fig. 1, means 1-2, 5, -6, and 11; page 4, lines 18-page 5, line 10).

Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the instant application's disclosed prior art, and further in view of Sugiyama et al (US 5,862,175).

As to claim 14, the instant application's disclosed prior art teaches that the determiner determines the modulation level (Fig. 1, means 1-2). The instant application's disclosed prior art is silent about the modulation level uses a number

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having an integer square root. Sugiyama, in the same field of endeavor, teaches a modulation communications system that the modulation scheme is varied among M-ary modulation schemes (n phase shift keying modulation schemes) each with a square root of the number of signal points being an integer (Fig. 1, 2^n multi-level modulation means; Col. 3, lines 5-9). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Sugiyama with the instant application's disclosed prior art in which selectable and flexible modulation of variable order can be performed.

As to claim 15, the instant application's disclosed prior art teaches that the determiner determines the modulation level (Fig. 1, means 1-2). The instant application's disclosed prior art is silent about the modulation level uses a number not having an integer square root. Sugiyama, in the same field of endeavor, teaches a modulation communications system that the modulation scheme is varied among M-ary modulation schemes (n phase shift keying modulation schemes) each with a square root of the number of signal points not being an integer (Fig. 1, 2^n multi-level modulation means; Col. 3, lines 5-9). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Sugiyama with the instant application's disclosed prior art in which selectable and flexible modulation of variable order can be performed.

Claims 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the instant application's disclosed prior art, further in view of Lee et al (US 6,259,744).

As to claim 16, the instant application's disclosed prior art teaches that the transmitting apparatus comprises a modulator (Fig. 1, means 6-1 and 6-2) that

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modulates the transmission data at a modulation level determined by the determiner (Fig. 1, means 1, 2, 6-1, and 6-2). The instant application's disclosed prior art is silent about the modulator modulates the transmission data by arranging signal points in such a way that a difference between the number of signal points on the I-axis and Q-axis is small. Lee, in the same field of endeavor, teaches a signal space diagram wherein the number of signal points on the I-axis is the same as the number of signal points on the Q-axis (Fig. 3). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Lee with the instant application's disclosed prior art in order to minimize header decoded BER (i.e. bit error rate) over many channel conditions (Col. 2, Lines 17-19).

As to claims 17 and 18, the instant application's disclosed prior art teaches that the transmitting apparatus comprises a modulator (Fig. 1, means 6-1 and 6-2) that modulates the transmission data at a modulation level determined by the determiner (Fig. 1, means 1, 2, 6-1, and 6-2). The instant application's disclosed prior art is silent about using a modulation scheme in which a phase direction is identified by an axis that crosses an origin point in a signal space diagram. Lee, in the same field of endeavor, teaches using phase determination axes (Fig. 3, means 54 and 56; Col. 5, Lines 1-12 and 51-53) passing through the origin point in a signal space diagram and computing the closest distance between the symbol and the bit on the decision line (i.e. amplitude identification). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Lee et al with the instant application's disclosed prior art in order to detect error probability of a bit in a symbol (Col. 5, Lines 7 and 8).

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As to claim 19, the instant application's disclosed prior art teaches the adder (Fig. 1, means 3) adds the error detecting bit (page 2, lines 10-12); the receiving apparatus further comprises a detector that performs error detection (Fig. 1, means 16) of each demodulation result (Fig. 1, means 14) in the demodulator using the error detection bit; and the detector outputs a bit without an error as an effective bit transmitted from the transmitting apparatus (Fig. 1, means 16). The instant application's disclosed prior art is silent about the error detection unit performs error detection every plurality of bits collectively. One of ordinary skill in the art would clearly recognize that error detecting bit addition every plurality of bits collectively is well known in the art (Cyclic Redundancy Check or CRC) and it is performed in order to enhance error reduction in the communications system.

As to claim 20, the instant application's disclosed prior art teaches all the subject matters claimed above, except for the transmitter transmits a pilot signal (training sequence or the second bit decision line) arranged in the middle of a maximum amplitude in a signal space diagram of the modulation scheme. Lee, in the same field of endeavor, teaches the pilot signal (Fig. 3, decision lines 54 and 56) is arranged in the middle of a maximum amplitude in a signal space diagram of the modulation scheme (column 5, lines 1-10 and 30-32; column 6, lines 47-50). One of ordinary skill in the art would clearly recognize that transmitting pilot signal from a transmitter to a receiver is well known in the art and it is performed for performance characteristic measurements and synchronization. Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Lee with the instant application's disclosed prior art in

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order to greatly improve the reliability of fields that carry the preferred information (column 2, lines 58-60).


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Freshteh N. Aghdam whose telephone number is (571) 272-6037. The examiner can normally be reached on Monday through Friday 9:00-5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Freshteh Aghdam
September 22, 2005


KEVIN BURD
PRIMARY EXAMINER